FINAL PERFORMANCE REPORT

Grant Number: NAG5-2456
Grant Title: *"Stellar Populations in M33 and M31"*
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The UV-brightest stars in M31 and M33, partly chosen from UV images of M31 and M33 obtained with the Ultraviolet Imaging Telescope, were observed with ground-based UBV CCD photometry and optical spectroscopy, to accurately determine spectral types, bolometric magnitudes and extinction. In this way, we selected the most favorable candidates for HST UV spectroscopy to study the stellar winds of hot stars in galaxies of the Local Group. With HST, we obtained high resolution spectra with the Faint Object Spectrograph (FOS) of the most luminous hot stars (O-B supergiants, WR, LBV) in M31 and M33, in the range 1200-3300A. From HST UV spectra and complementary optical data (KPNO, CFHT, IAC-WHT) we derived the stellar parameters: Teff, Lbol, g, R, abundances, mass loss rate and wind velocity. We analyzed the UV wind lines with the SEI method to derive wind velocity. From observations of the Halpha emission line, and the Hgamma profile at high resolution, which are not affected by ionization uncertainties as the UV ions, we very accurately derived the mass loss rate and the gravity. We obtained these spectra at the 4.2m WHT tel. at IAC (Canary Island, Spain), and we analyzed them with a SEI-Balmer method (Bianchi et al.1994) and non-LTE model atmospheres.

Spectra and derived parameters of M31 and M33 stars were compared with Galactic and LMC stars of the same type, and with theoretical predictions.

We also derived properties of the intervening ISM, both in the host galaxy and in the Milky Way halo.

References

Three papers are in preparation, and the following have been completed:

Bianchi, L., Lamers, H., Hutchings, J., Massey, P., Kudritzki, R., Herrero, A., Lennon, D., 1994, Astron. Astrophys., 292, 213 {Ultraviolet and optical spectroscopy of a B supergiant star in M31}

Bianchi, L., Hutchings, J., 1994, in "Evolution of Massive Stars: A confrontation between theory and observations", eds. Vanbeveren, D., van Rensbergen, W. and de Loore, B., Space Science Reviews, Vol. 66, p.183 {The stellar winds of massive stars in M31}

Bianchi, L., Bohlin, R., Hutchings, J., Massey, P., 1995, BAAS, 26/4, 1434 {Hot stars in external galaxies beyond the Magellanic Clouds: observations of supergiants in M33 and M31}

Haser, S., Lennon, D., Kudritzki, R., Puls, J., Paudrach, A., Bianchi, L., and Hutchings, J., 1995, Astron.Astrophys., 295, 136 {The stellar wind of an O8.5I(f) star in M31 - a determination of mass loss rate and metallicity}

Bianchi, L., 1995, Invited talk, SEA Workshop "Astrofisica con Plataformas Espaciales", Sitges, (Spain), May 1995 {Hot stars and the ISM in M31 and M33 from HST observations}
Bianchi, L., Bohlin, R., Clayton, G., Hutchings, J., Massey, P., 1996: BAAS, 187, {The UV Interstellar Extinction in Nearby Galaxies: M31}

Bianchi, L., Hutchings, J.B., Massey, P., 1996, A.J., submitted {Hot stars in external galaxies III: HST UV line studies of O and B supergiants in M31 and M33}

Massey, P., Bianchi, L., Hutchings, J.B., Stecher, T., 1996, Ap.J., submitted {The UV-Brightest Stars of M33 and its Nucleus: Discovery, Photometry, and Optical Spectroscopy}

Bianchi, L., Bohlin, R., Clayton, G., Hutchings, J.B., Massey, P., 1996, in prep. {UV Extinction by Interstellar Dust in External Galaxies: M31}

Bianchi, L., Manchado, A., Bohlin, R., et al., 1996, in prep. {Hot stars in external galaxies IV: WR stars in M31 and M33}

Bianchi, L., Scuderi, S., Manchado, A., Bohlin, R., et al., 1996, in prep. {Hot stars in external galaxies V: Mass loss rates from M31 and M33 supergiants}